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COMMONWEALTH OF AUSTRALIA

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BULLETIN No. 159

# Poisonous and Harmful Fishes

*(Division of Fisheries—Report No 10.)*

*By*

G. P. WHITLEY, F.R.Z.S.

MELBOURNE, 1943

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# FOREWORD.

This Bulletin affords a practical guide to all the poisonous and harmful fishes likely to be encountered in Australia, New Guinea, and the Islands of the south-western Pacific. It is hoped that it will be particularly useful to members of the Allied Forces who may be unfamiliar with the strange fishes of those regions, some of which, though of attractive appearance, are very poisonous if eaten, whilst others cause excruciating pain by stinging with their spines.

The illustrations of the various fishes to be avoided as food or approached with caution because of their venom should be carefully studied in connexion with the text.

Simple methods of *treatment* for food-poisoning (p. 15) and wounds from venomous fishes (p. 25) are included.

A more detailed and technical report on poisonous and harmful fishes (with a review of what has already been published on the subject and a comprehensive bibliography) has been assembled for separate publication. It is intended to issue this shortly, when it will be available to all interested persons.

H. THOMPSON,
Chief, Division of Fisheries.

Cronulla, New South Wales.

# Poisonous and Harmful Fishes.

## I. INTRODUCTION.

Most fishes can be eaten without fear of ill effects, but there are a few poisonous kinds; furthermore, some fishes can inflict serious injury by means of stinging spines. The aim of this Bulletin is to enable persons in Australia and adjacent seas to recognize and avoid these harmful and poisonous fishes. It is written in non-technical language, but a more detailed scientific report has also been prepared for separate publication.

Unfortunately, no hard and fast rules can be laid down, or tests described, for distinguishing fishes likely to be poisonous. The reader is recommended to study carefully the accompanying illustrations of certain kinds proved injurious, and to compare the "parts of a fish" in Fig. 1 with corresponding parts in the other pictures. Friendly natives should be appealed to as they can distinguish, from experience, the deadly or dangerous fishes of their regions.

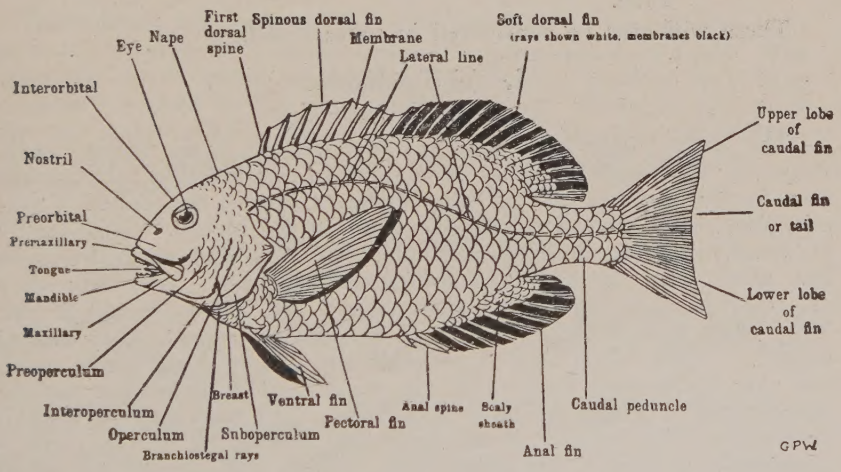


FIG. 1.—Parts of a Fish.

Fishes harmful (and sometimes fatal) to man fall into three main groups:

1. *Poisonous* fishes: those poisonous as food, e.g., toado.
2. *Venomous* fishes: those with spines, venom-glands, &c., capable of stinging, e.g., stonefish, stingray, catfish.
3. *Aggressive* predaceous fishes which attack man, e.g., sharks.

These will be dealt with in order.

## II. POISONOUS FISHES.

There are two main causes of fish poisoning:

(*a*) *Bacterial* poisoning, caused by germs in the fish, not necessarily due to putrefaction, though fish is naturally preferable fresh. (In rare cases, some persons are allergic to fish as food.)

(*b*) *Toxic* poisoning, caused by poisons (toxins) produced in the tissues (notably of the liver or reproductive organs) of the fish.

Bacterial poisoning may be obtained from eating any kind of fish and depends upon whether one is unlucky enough to be stricken by the germs.

Toxic poisoning is easier to avoid as we know that certain kinds of fishes have caused, on numerous occasions, illness or death, and we have only to abstain from these fish (or any that look at all like them).

Toxic fishes belong to the following groups, the most deadly being placed first:

(1) Toados and their near relatives the porcupine fishes, box-fishes, and trigger fish.

(2) The Red Bass and Chinaman Fish group.

(3) Sweetlips. (4) Hinds. (5) Goatfish. (6) Adult Sea Pike.

These will now be considered in more detail.

### 1.—(*a*) Toadfishes.

(Plate 1, Figs. A—C.)

The Toad, Toadfish, or Toado is also known as the Globe, Swell, Blow-, or Puffer-fish* because of its habit of self-inflation. It belongs to a family of fishes having many different species and called *Tetraodontidae,* after the four beak-like teeth in the mouth. This family is found in almost all warm and temperate seas, and Australia alone has more than 30 different species of Toadoes. Generally they are small in size, under 8 inches in length, but a few exceed 2 feet. They enter very shallow water and feed on crabs and other animal matter. They often have a peculiar and rather disagreeable smell and may grunt when taken from the water. The bodies are oval or pear-shaped. There are no ventral fins. The skin may be smooth or studded with prickles or spines. The puffing up of the body is apparently a means of self-defence, though some toad-fishes float upside down in an inflated condition, when they are transported by currents. Some species have prickly or spiny bodies, almost as spiny as those of their close allies the Porcupine fishes (*Diodon,* with two teeth in the jaws), which are also poisonous. The colours are diverse, according to the species; toadoes may be almost any colour, plain, spotted, striped, banded, or marbled.

There have been many cases of poisoning through eating Toadoes in Australia and the Islands. In 1774, Captain Cook was very ill through eating the flesh of one (*Pleuranacanthus sceleratus*) at New Caledonia (see Plate 1, Fig. A).

* Similar fishes are known as Botiti in the Philippines, Maki Maki or Death Fish in Hawaii, Buntak in Malaya, Fugu in Japan, Sui in Samoa.

### (*b*) Porcupine Fishes.

(Family *Diodontidae.*)

(Fig. 2.)

These are very similar to Toadoes, but have the body beset with long spines and have only two teeth in the jaws (instead of four), forming a parrot-like beak. They are very poisonous as food. There are several different genera and species throughout the Indo-Australian area.

### (*c*) Boxfishes, Cowfish, or Coffin Fish.

(Family *Ostraciontidae.*)

(Fig. 3, centre and lowest Figs.)

Several species of this family have been listed as poisonous, though it is difficult to imagine people eating them since the whole of the fish's head and body is immovably encased in a bony "box," making whatever flesh there is inside not worth extraction.

### (*d*) Trigger Fish or Filefish.

(Family *Balistidae.*)

(Fig. 3, top Fig.)

These fishes are very similar to Leatherjackets except that their bodies are covered with rough scales, like the surface of a file. The trigger-like dorsal spines can be locked in an erect position by a bony mechanism worked by the muscles of the fish. They are said to be poisonous as food and should be avoided. Even the excellent Leatherjackets (family *Aluteridae*) should only be eaten when quite fresh or properly refrigerated.

## 2.—(*a*) The Red Bass Group.

(Plates 2 and 3.)

In Queensland and some of the Pacific Islands, certain large red or pinkish fishes not unlike the Australian Snapper and Bream* have caused severe fish-poisoning.

In the case of the Island fishes, no specimens appear to have been obtained for scientific study for many years, so their precise identification has not yet been settled. Practically all we know about them was recorded by the old explorers, notably Quiroz in 1606 and Captain Cook in 1774, who called them Pargos, Pagrus, or Sparus.

With reference to Quiroz's experience on 27th May, 1606, in the Bay of St. Philip and St. James, Solomon Islands, Sir Clements Markham relates:

"It happened that they fished in a certain place whence they brought to the ship a quantity of *pargos*, which are considered poisonous, like those in Havana and other ports. As many as ate them were attacked by nausea, vomiting, and feverish symptoms."

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* The differences between Snappers and Breams (*Sparidae*) and the Red Bass Group (*Lutjanidae*, &c.) are too technical to be detailed here, being mainly concerned with parts of the skull.

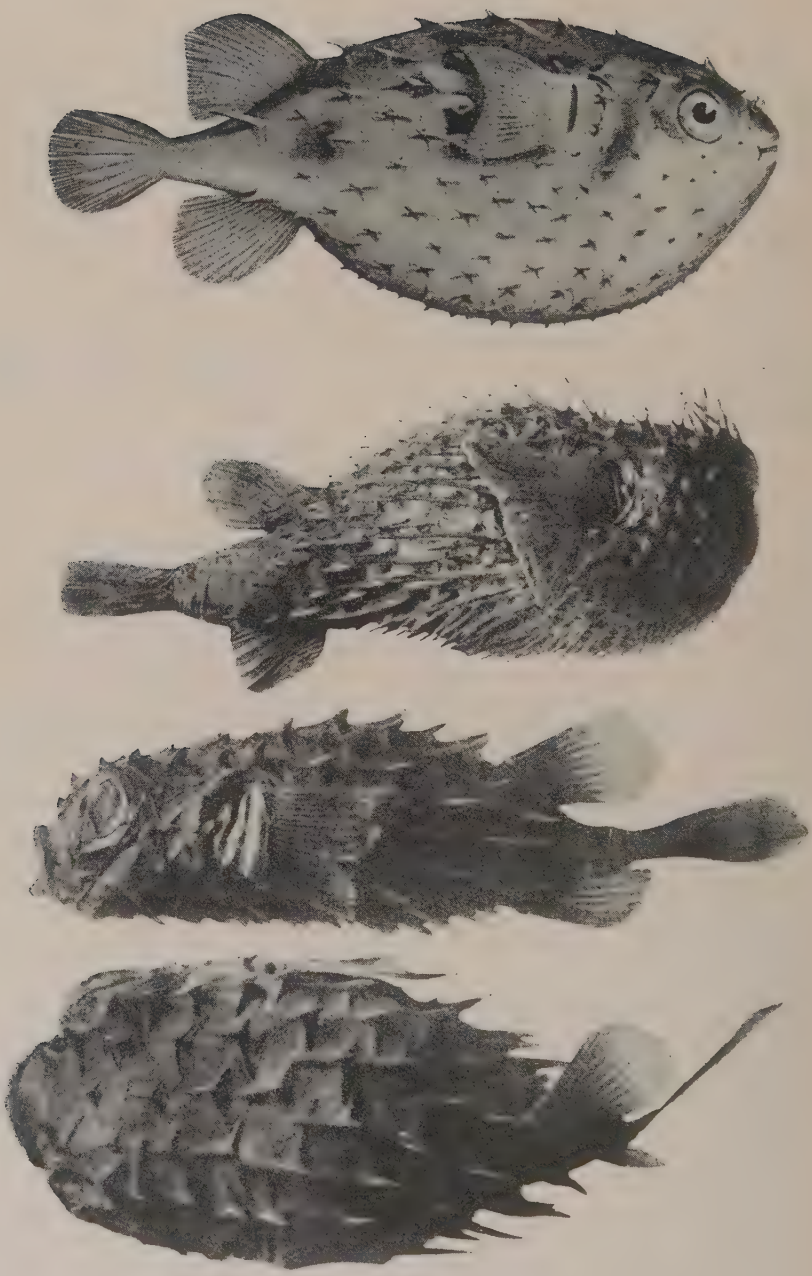

FIG. 2.—Porcupine Fishes.

*NEVER EAT THESE.*

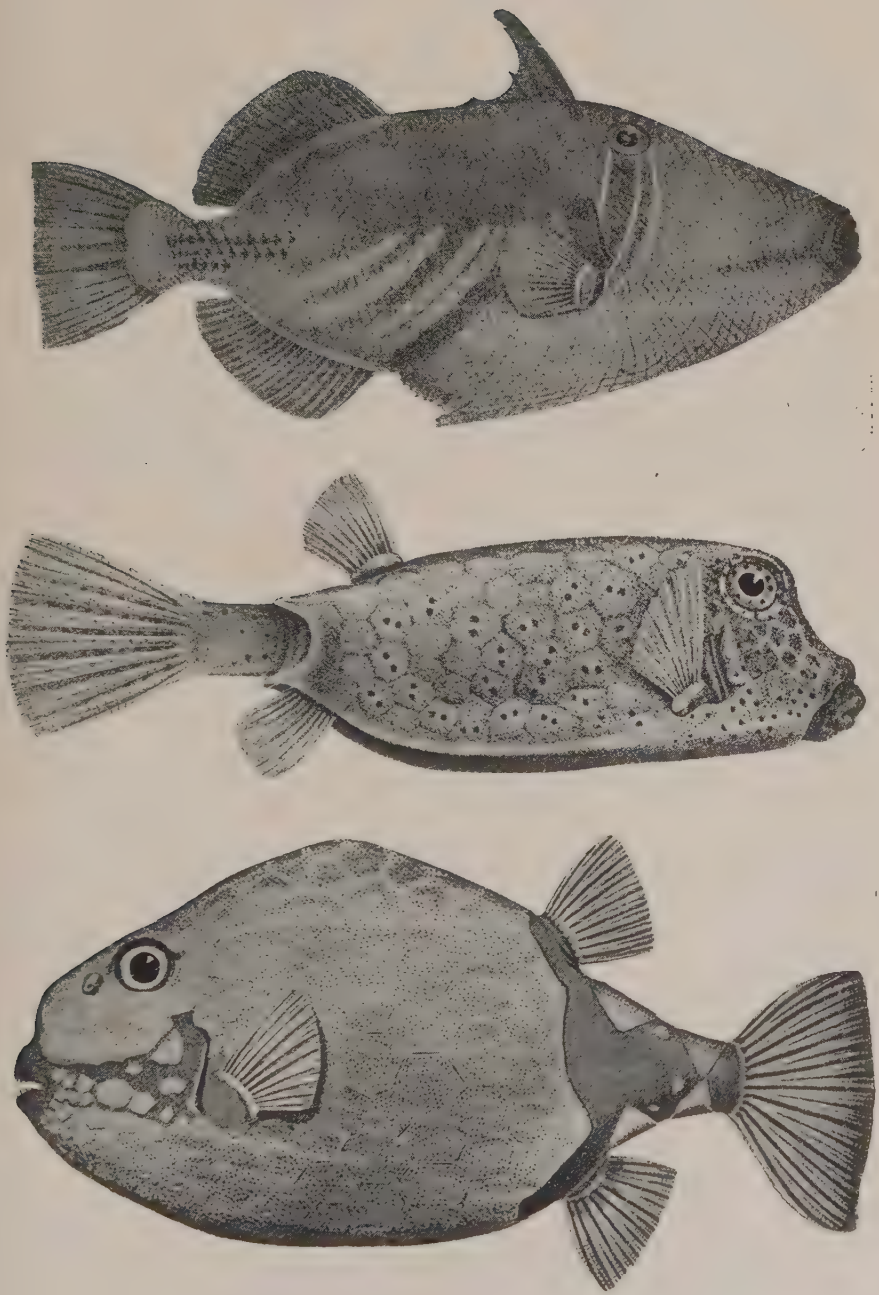

FIG. 3.—Filefish (top) and Boxfishes (centre and bottom).

*NEVER EAT THESE.*

" In the *Capitana* alone as many as 55 persons were laid up . . . The ships were like a town hospital with the plague, and none could stand on their feet . . ."

The Pargos, Pagrus, or Porgy was possibly some kind of Snapper or Hussar, similar to the Spanish Sea Bream (*Pagrus vulgaris* or *Sparus pagrus* of authors). Unfortunately, it is not known exactly what species of fish Quiroz encountered, so no picture can be given here, but it may have been like the Chinaman Fish and Red Bass dealt with hereunder. Perhaps the same kind of fish was responsible for poisoning Cook's men on the *Resolution.*

Cook (1779) relates that two or three reddish fish were hooked in Port Sandwich, Mallicolo I., New Hebrides on 24th July, 1774. The following night, all who had eaten of them were seized with violent pains in the head and bones, attended with a scorching heat all over the skin, and numbness in the joints. The pigs and dogs were also taken ill and two died. It was a week or ten days before all the officers recovered. Persons in the Solomon Islands and New Hebrides particularly should look out for these fishes, which are described as being large (about 15 inches long), reddish, and having scales.

### (*b*) The Chinaman Fish.

(*Paradicichthys venenatus* Whitley, 1930.)

(Plate 2, Figs. A—B; Plate 3, Fig. A.)

The shape, fins, and colour pattern of this large snapper-like fish can be best appreciated from the accompanying figures. Coloured casts of it are exhibited in the museums of Brisbane and Sydney. The Chinaman Fish has prominent canine teeth, long rays in the dorsal fin in young fish, and the tail fin is not markedly forked.

When alive, the Chinaman Fish is conspicuously barred and banded with red, of various shades, and white, forming a criss-cross pattern on the body. The belly is whitish.

So far it has only been recorded from the Great Barrier Reef, but it ranges along the coast of Queensland, and doubtless occurs in Indo-Pacific waters as well. Mr. T. C. Marshall states that it is rarely found in the southern half of the Queensland coastline.

The Chinaman Fish is fairly plentiful in the neighbourhood of the Great Barrier Reef in Queensland, and is caught in water varying in depth from 40 feet to 150 feet, most frequently at a depth of about 60 feet. It is usually found where the floor of the sea is covered with live coral growth, and does not rise for more than a few feet from the bottom in search of food. It may be caught by any variety of fish bait and affords good sport for anglers, as it fights fiercely for its life when hooked. It grows to 3 feet long and a weight of 34 lb. according to Mr. T. C. Marshall, but the average fish caught does not exceed 10 lb. in weight. Its flesh has a delicate flavour when cooked for food, but eating it is frequently followed by symptoms of poisoning.

### (c) The Red Bass (or Kelp Bream of Townsville).

(*Lutjanus coatesi* Whitley, 1934.)

(Plate 3, Fig. B.)

This fish is allied to the Chinaman Fish, but differs as follows:—

A. Soft dorsal fin much higher than spinous dorsal fin and with lengthened rays in younger fish. Pectoral fin short, not reaching anal fin. Tail fin not strongly forked. Scales smaller, about 56 along lateral line. Upper profile of head more convex. No notch on preoperculum. No teeth on vomer.* . . . . Chinaman Fish (*Paradicichthys venenatus*).

B. Soft dorsal fin with none of the rays as long as the longest dorsal spine, none of them elongated. Pectoral fin long, reaching level of origin of anal fin. Tail fin forked. Scales larger, about 50 or 52 along lateral line. Upper profile of head sloping, almost straight. A notch, embracing a boss, on edge of preoperculum. A V-shaped patch of teeth on vomer.* . . . Red Bass (*Lutjanus coatesi*).

The Red Bass is also smaller, generally little more than 2 feet in length. It is reputed to be poisonous as food, but no precise medical data are available on this point. Several species of this genus, *Lutjanus,* are suspect, although generally they are esteemed as food. They may often be distinguished by a notch on the margin of the preoperculum which receives a knob or boss which arises from the interoperculum. (See diagram of "Parts of a Fish," Fig. 1, and compare Plate 3, Figs. A and B.)

The Red Bass has been recorded from the Townsville district, Queensland, and Elizabeth Reef, in the South Pacific Ocean, but may occur over a much wider range. In the Cairns district, it seems to be confused with the Chinaman Fish.

In colour, the Red Bass is generally rosy or burgundy red; dark along the back and gradating to pink along the belly. Operculum yellowish. Head with several small wavy lines and blotches of dark lavender. Each body scale with a boomerang-shaped lighter patch. Eye peach red encircled with narrow border of cadmium orange. Inside of mouth creamy white. Dorsal fins maroon to scarlet. Other fins rosy, outer edges of tail, ventral and anal fins blackish.

### 3. Sweetlips.

(*Lethrinus* and *Lethrinella.*)

(Fig. 4, lower two.)

These fishes are much like the Sydney Black Bream (*Roughleyia australis*), but have no scales on the sides of the head. A few cases of poisoning (probably due to bacterial infection and independent of the kind of fish) have been reported, but ordinarily they are good to eat.

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* On the mid-line of the roof of the mouth, just behind the jaw teeth.

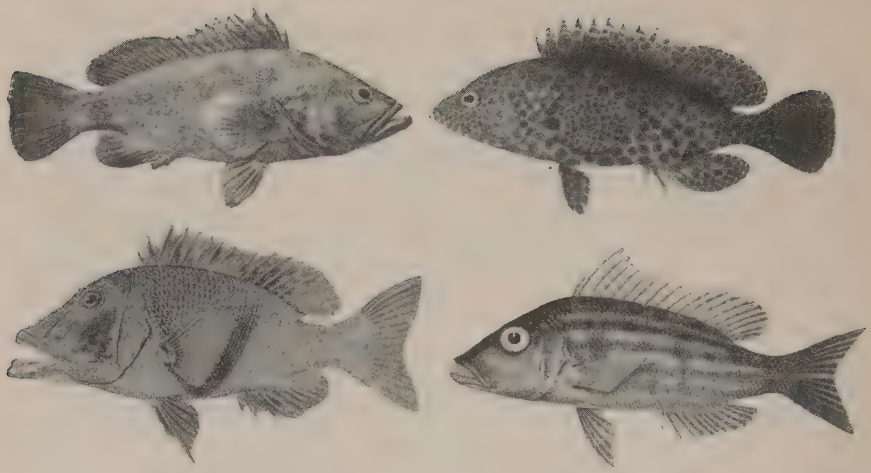

FIG. 4.—Hinds (upper two) and Sweetlips (lower two).
*MAY BE POISONOUS AS FOOD.*

### 4. Hinds.

(*Epinephelus* spp.)

(Fig. 4, upper two.)

Many kinds of "rock cods," hinds, or garrupas are to be caught amongst rocky reefs; these, like the trevallies (*Caranx*), mackerel, &c., have been regarded by some authors as poisonous at times, but the cases reported were probably due to pathogenic bacteria.

### 5. Goatfish or Red Mullet.

(Family *Mullidae*.)

(Fig. 5.)

The two feelers or barbels hanging from the chin of the goatfish render it easy to identify. The flesh is edible, indeed delicious, and provided feasts for epicures in Roman times, but it has been found in Hawaii that eating the brain is followed by delirium and mental paralysis.

FIG. 5.—Goatfish.
*NEVER EAT THE HEAD.*

## 6. Sea Pike.

(*Sphyraena* spp.)

(Figs. 6 and 7.)

The Sea Pike of Australia is allied to the Barracuda of the West Indies, but has nothing to do with the Barracouta of Australia (*Thyrsites*). It has a pointed head with strong fangs, well-developed

Fig. 6.—Sea Pike or Barracuda.

scales on head and body, and two separate dorsal fins. Large specimens of the Sea Pike (more than about $2\frac{1}{2}$ feet long) have a bad reputation in the West Indies as being poisonous, but I know of no cases from the Pacific. The American Sea Pike also attacks bathers like a shark.

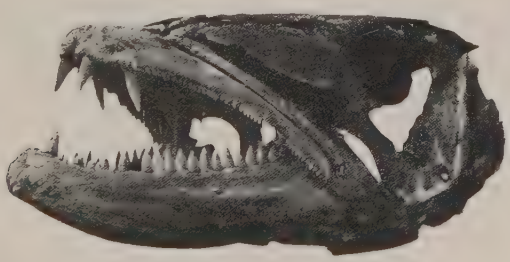

Fig. 7.—Teeth of Fijian Barracuda.

## 7. Treatment for Bacterial Poisoning.

"In the prevention of bacterial fish poisoning the greatest care must be taken in the avoidance of contamination of food, its storage, efficient cooking, and the avoidance of contact with flies, rats, mice, &c.

The patient should be put to bed and given a liquid diet and brandy—two hourly. Milk is probably best avoided. Hot applications should be made to the abdomen—and morphia may be indicated—in early cases emetics or gastric lavage may be of value. The bowel should be washed out if there is much diarrhoea. If the loss of fluid by vomiting or diarrhoea is great, saline should be given intravenously. Bacteriological investigation of the stools should be carried out whenever possible."—(Dr. V. M. Coppleson.)

## III.—VENOMOUS FISHES.

Apart from their teeth, most fishes have spines in their fins and some have spikes on the head as well, which are capable of wounding anyone handling them. Even some small sharks (dogfishes) have a spine before each dorsal fin and lash out with these weapons. In the majority of cases, such flesh wounds heal without complications, provided no dirt, fish slime, or germs enter them. Some fishes, however, have venom-glands associated with the spines, which make them doubly dangerous. The bites of eels may become septic. Eels (many species, mostly of the genus *Gymnothorax*) are common lurking amongst coral, stones, &c. Surgeon and Unicorn fishes have sharp, knife-like blades on each side of the tail which can cut deeply, but are not venomous. The main kinds of stinging or venomous fishes likely to be encountered in Australia or the Indo-Pacific Area are:

(1) Stingrays.
(2) Catfishes.
(3) Stonefishes.
(4) Waspfishes, Rock Cods, Butterfly Cod.
(5) Miscellaneous: Spinefeet, Bastard Stonefish, &c.

All these *venomous* fishes are only dangerous because of their spines, &c., all of them are *good to eat.*

Most of these fishes are easily recognized.

### 1. Stingrays.

(Fig. 8.)

Stingrays are flat, kite-shaped animals with the gill-slits under the conjoined head and body. They have a long tail, provided with one or more long, hard, barbed spines. There are many different species of Stingrays and Eagle Rays, some of very large size, but all can inflict a very painful wound, and the spine is difficult to remove because of its barbs. They are good to eat, but the tail, with spine, should be chopped or cut off before the fish is handled.

### 2. Catfishes.

(Figs. 8 and 9.)

Catfishes are characterized by the barbels or "cats' whiskers," generally six to eight in number, which protrude around the mouth; they have no scales. The dorsal and pectoral fins are generally armed with a venomous serrated spine rather like that of a stingray. A sting from one of these is painful, out of all proportion to the slight scratch it may give.

The two main kinds of Catfishes are the brown and silvery striped *Plotosus,* with a pointed tail, and the fork-tailed *Tachysurus,* but there are many species which can only be determined by experts. They are mainly inhabitants of muddy estuaries, and a few grow to

a large size. The best way to kill them is to stab the middle of the top of the head with a knife—there is a weak spot here (the fontanelle), a slit in the top of the otherwise impervious skull. In the Swan River and other inlets, Western Australia, there is a kind of catfish known as the Cobbler (*Cnidoglanis macrocephalus*) which is feared because of its spines; the Cobbler of South Australia is a Scorpion Fish allied to the Bullrout and Fortescue (see p. 21).

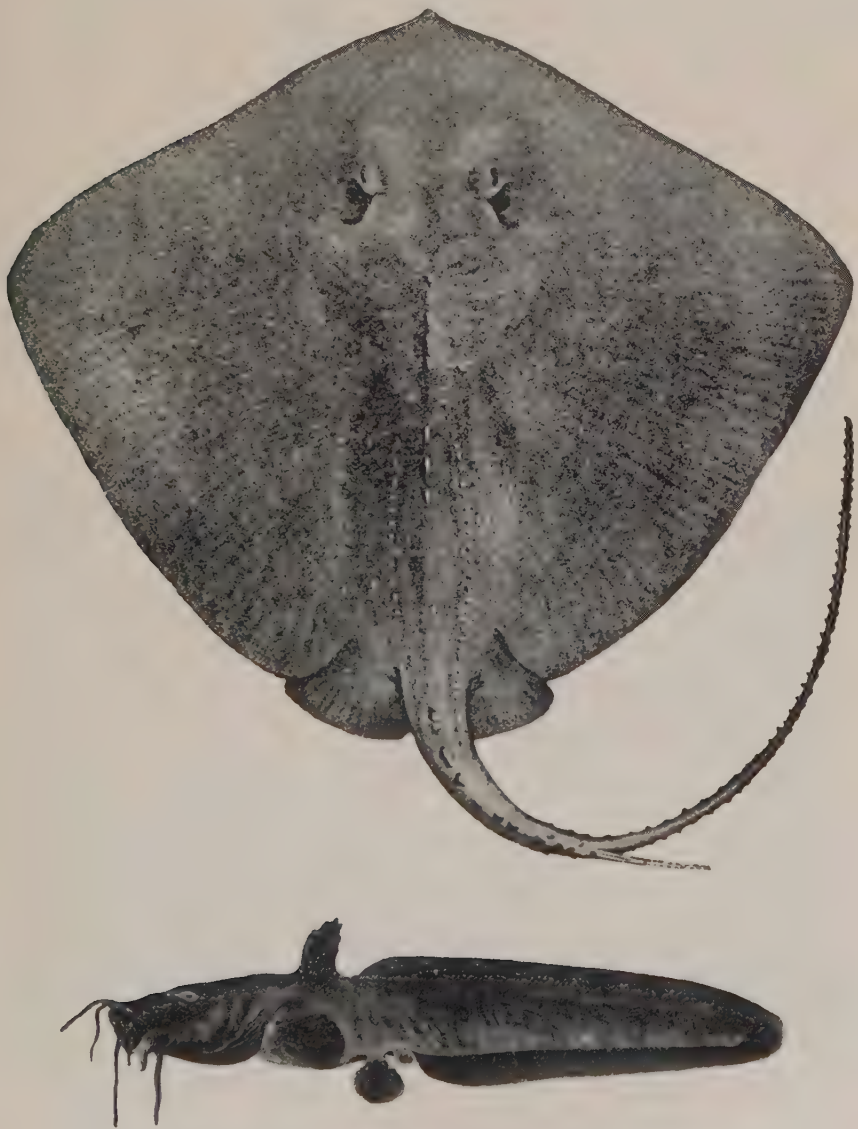

FIG. 8.—Stingray (above) and pointed-tailed Catfish (below).

*SPINES VENOMOUS.*

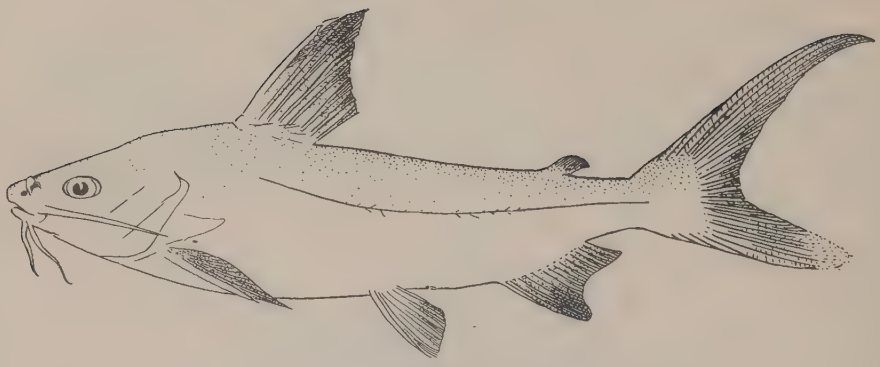

FIG. 9.—Forked-tailed Catfish.

### 3. Stonefishes.

(Family *Synancejidae*.)

(Figs. 10-12.)

Stonefishes are so called because of their remarkable resemblance when in the water to blocks of eroded rock or weathered coral. Unlike most fishes, they do not swim away when approached, but lie quite still, and so are practically indistinguishable from their surroundings. Often stonefishes lie under rocks or almost buried in mud so that it is possible to tread on them or touch them with the hand when turning over coral or stones.

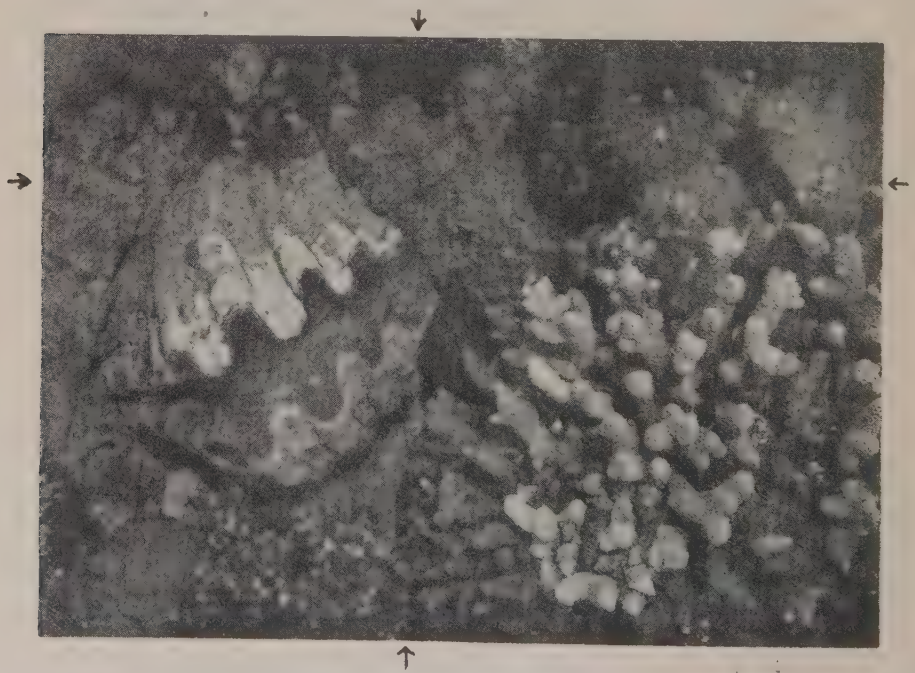

FIG. 10.—Stonefish *in situ* on a coral reef. It is occupying a position, about 1¼ in. by ⅞ in., at the point where the arrows converge. The head of the fish is facing the top left corner and its tail is below the clump of coral.

Along the back of the Stonefish is a row of thirteen strong spines, hidden by puckered skin which also conceals the bags of poison, one on each side of every dorsal spine. The glands which secrete the venom are excellently shown in an exhibit in the Fish Gallery of The Australian Museum, Sydney, and are shown in Fig. 12. Though the skin of the fish may easily be slipped back so as to leave the end of the dorsal spine protruding, the glands are more firmly secured, and their position is such that their contained venom is squeezed out by the slightest pressure. It is then forced along deep grooves which extend along each side to the tips of the spines, and is so conveyed into the depths of any wound they may inflict. The spines of a Stonefish can penetrate a sandshoe to enter a wader's foot. This

Fig. 11.—Stonefish.

*SPINES ALONG BACK VENOMOUS.*

poison is extremely virulent, the Stonefish being the most venomous fish known, and immediately causes fearful pain so that a person may become almost demented, may fall in the water, and thereby risk drowning, his limbs may swell and, if he cannot obtain medical treatment, he may die.

The colour of the Stonefish is very variable, generally brownish or greenish, mottled or marbled, but perhaps can be changed, chameleon-fashion, by the fish itself. A fine Thursday Island specimen in The Australian Museum was scarlet, with a close network of grey markings. There are dark eyelike markings below the small true

eyes and near the nape, whilst there are streaks, lines, and spots of varying tones on body and fins. The belly is white as is also the inside of the mouth, except for some green inside lips.

In life, the fish is coated with a brown or dark-greenish slime in which algae may be present. It is also said to squirt fluid from its warty skin.

Little is known of its life history. It is presumed to lay eggs (though some of the allied Scorpaenoid fishes are viviparous), and the larvae and very young stages are unknown. The average size is less than 1 foot, but some exceed 15 inches in length and 2 lb. in weight. The maximum size is said to be 2 feet long. The Stonefish feeds upon small fishes, crustacea, and other marine animals, and can live a couple of hours out of water.

Fig. 12.—Stonefish dissected to show poison glands.

Stonefishes are found throughout the Indo-Pacific region in tropical reefs and estuaries. They are strictly marine, and whilst they may enter river-mouths have not been recorded from fresh water. There are a number of different species, some from the volcanic South Sea Islands resembling blocks of lava rock; others in Japan and

Queensland like small pieces of coral "clinker." The common Australian Stonefish is technically known as *Synanceja trachynis* (Figs. 10 and 11), a close ally of *S. horrida* of India. Our species is found right round the tropical coast line of Australia from Moreton Bay up the Queensland coast to Torres Strait, across to Darwin and down the western shores to Houtmans Abrolhos. We also have a second species, *Synanceichthys verrucosus* (Fig. 12), recorded from Queensland, the Indian Ocean, and many Pacific Islands, but this is not so frequently obtained as *Synanceja trachynis*. They may be told apart by the formation of the head, as shown in the figures here.

### 4.—(*a*) Scorpion or Waspfishes, Fortescue, Rock Cods, &c.

(Family *Scorpaenidae.*)

(Figs. 13 and 14.)

The Red Rock Cod of south-eastern Australia, which is not a true Codfish, is an example of the Scorpion-fish family which includes many species of fishes which resemble, in form and colour, the rocks and weeds amongst which they lurk. All possess stinging spines in the dorsal fin and often the head is spiny too. A characteristic bony ridge extends across the cheek from about the eye to the edge of the preoperculum and often bears spines. The body is at least partly scaly, sometimes with small weed-like flaps of skin amongst the scales. Most of the kinds are only a few inches long, but a few exceed 1 foot in length.

Fig. 13.—Fortescue.

*SPINES VENOMOUS.*

The Fortescue (*Centropogon australis*), having sixteen dorsal spines, the Bullrout (*Notesthes robusta*), with fifteen dorsal spines, and the twelve-spined Red Rock Cod (*Ruboralga jacksoniensis*) of eastern Australia are well known. A South Australian ally is the Cobbler (*Gymnopistes marmoratus*). Others are known as "Sulkies" in north-western Australia.

An article by Dr. L. Kesteven on the venom of the Bullrout, *Notesthes robusta,* gives an account of typical Scorpion Fish poisoning. Dr. Kesteven remarked:—

"The symptoms are in no way confined to the mere pain and discomfort of an ordinary cut or scratch, or the irritation arising therefrom. There are very marked and distinct symptoms of the direct effect of venom.

The first of these to manifest itself is the rapid appearance of an erythematous blush, which spreads around the wound for some distance, in a manner not noticeable in ordinary incised wounds; the pain is out of all proportion to the very insignificant nature of the injury; it radiates in an altogether abnormal manner, compared with ordinary pricks or scratches, in many cases extending to the shoulder, or even up the side of the neck; the temperature varies greatly, in most cases going up two, three, or more degrees within a very short time: lasting thus for a varying time, and going down again as rapidly, often below the normal, when severe collapse occurs, necessitating the free administration of stimulants to counteract the heart failure which threatens.

Cases treated as in the ordinary methods for snake-bite—chiefly I have found permanganate the most efficacious—can be relieved considerably if taken in hand soon after the sting; but if the poison has had time to put in its fine work, so much the longer does the recovery take. Extreme prostration, for several days, often follows the stings, leaving the patient weak and exhausted.

These symptoms are not compatible with non-toxic wounds. They are undoubtedly venomous."

In tropical waters the little brownish "Rock Cods," *Scorpaenodes* (thirteen dorsal spines), and *Sebastapistes* and "*Scorpaena*" spp., may be found under stones on coral reefs. The Demon Stinger (*Inimicus*) has long dorsal spines and lurks among stones in deeper water. It is advisable to wear gloves when turning over coral or rocks and to wear thick boots when wading amongst coral as some protection against coral cuts and the spines of venomous fishes. In northern Australia, a harmless fish (*Centrogenys*) imitates in form and colour the venomous Scorpaenids.

Care should be taken when picking up bunches of seagrass or weed in hauling-nets in estuaries, as Fortescues often get caught in the weeds and stab an unwary handler. All these fishes may be picked up by one of the *pectoral* or side fins if it is necessary to handle them, the dorsal and head spines being then out of reach.

### (*b*) Butterfly Cod.

(*Pterois* and *Brachirus* spp.)

(Fig. 14, bottom.)

The Butterfly Cod or Red Fire fish can be distinguished by its streamer-like fin-rays and membranes which it extends like fans. It is found lying under loose stones or amongst coral, is about 1 foot long, and does not usually swim away (or only slowly) when disturbed. Along the back are needle-like dorsal spines which, when touched, cause a painful wound. They are venomous, like those of the Stonefish, but the effects are not so severe or as dangerous.

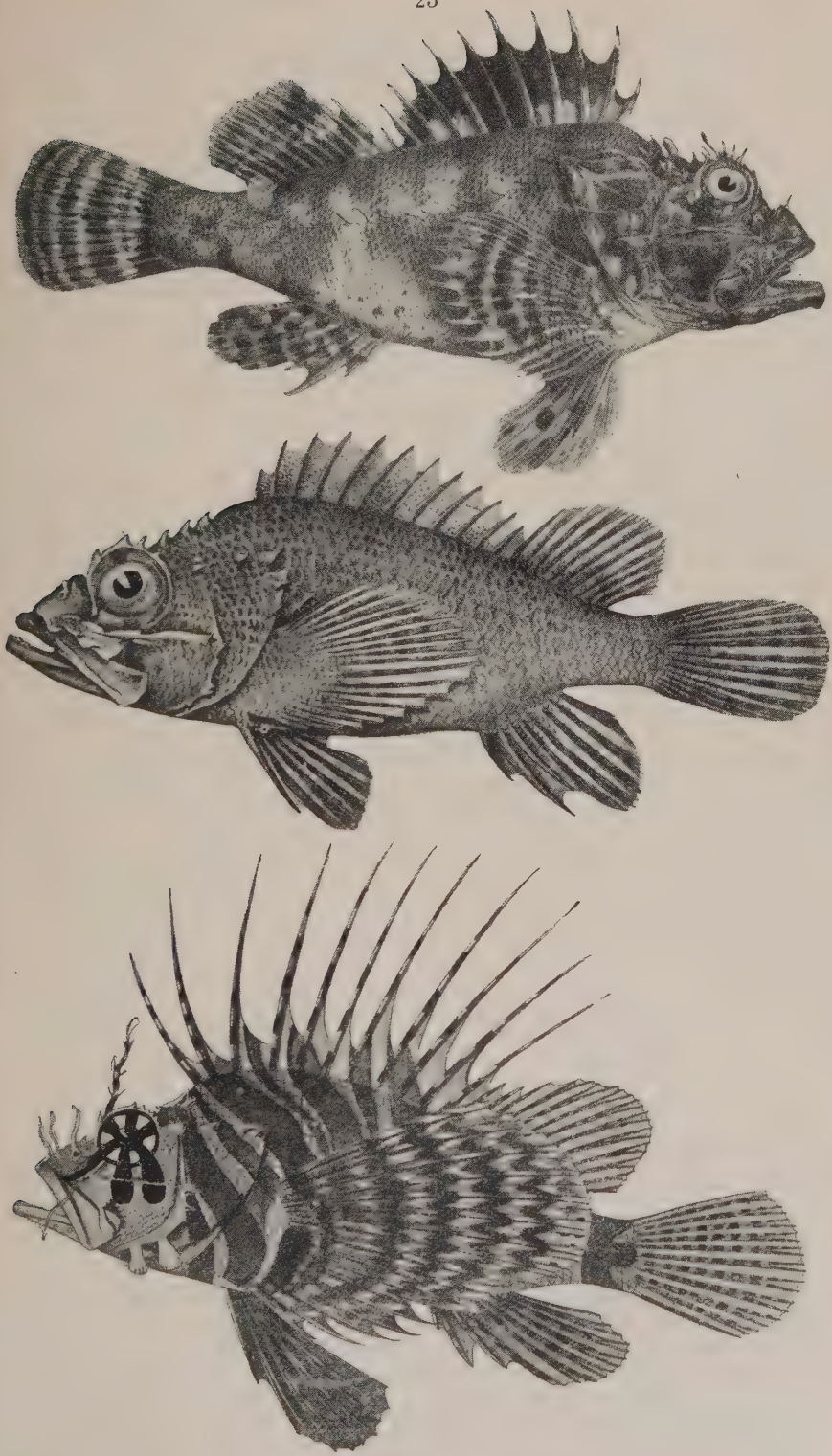

Fig. 14.—Red Rock Cod (top); Scorpion Fish (centre); Butterfly Cod (bottom)
*SPINES VENOMOUS.*

### 5.—(*a*) Tangs or Surgeon Fishes.

(*Teuthis* spp.)

(Fig. 15.)

The Surgeon fishes are so named because there is one lancet-like spine on each side of the stalk of the tail (caudal peduncle). Each spine can be erected to inflict a sharp cut when the fish lashes with its tail. There are many different species in tropical waters, about 1 foot long, often brightly or even gaudily coloured. Their flesh has been reported in rare cases to be poisonous, but should be edible when quite fresh.

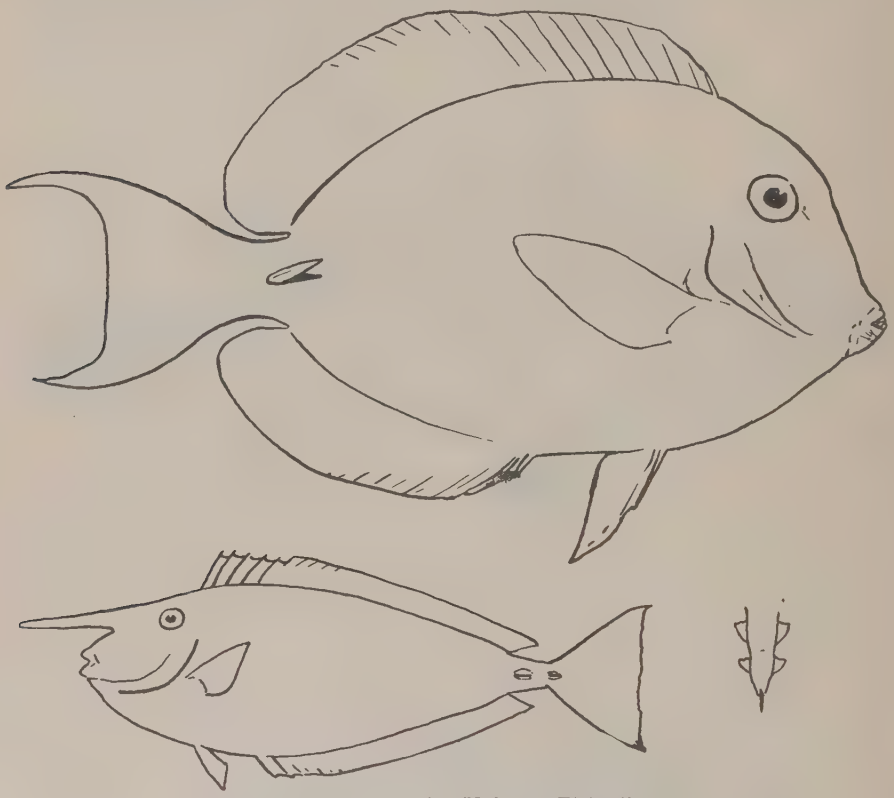

Fig. 15.—Tang (above); Unicorn Fish (below).
*SPINES NEAR TAIL DANGEROUS.*

### (*b*) Unicorn Fish.

(*Naso* spp.)

(Fig. 15.)

Adult unicorn fishes are easily recognizable by the long bony "nose." They are related to the Surgeon fishes, but are usually larger and have more than one blade-like spine (generally brightly coloured) on each side of the stalk of the tail. There are several species, of various colours, in tropical seas. They feed in schools, tails uppermost and waving, and should be handled very cautiously, as the tail blades are razor sharp, though not venomous.

### (c) Spinefeet.

(*Amphacanthus* spp.)

(Fig. 16.)

Fishes of usually sombre variegated colours, sometimes spotted, and easily distinguished because they have more than six spines in the anal fin. Ventral fins with an outer and inner spine and three soft rays between. Wounds from the fin spines have been reported as being very painful, owing to venom. Length of fish usually about 1 foot.

### (d) Frogfish or Bastard Stonefish.

(*Halophryne* and *Pseudobatrachus.*)

(Fig. 16, bottom.)

A naked-skin fish with frilly side fins and variegated coloration found amongst stones and coral in tropical seas, sometimes creeping over mud. It can live a long time out of water. It is feared on account of three stubby spines in front of the dorsal fin and others on the head, but I know of no authentic case of poisoning from this source. The repulsive toad-like appearance and slimy mucus of the body probably contribute to this fish's unpopularity. Length about 9 inches.

### 6. Treatment of Wounds by Venomous Fishes.

The following treatment is recommended by Dr. V. M. Coppleson, to whom I am indebted for preparing this statement.

Immediately after wounding, the area should be covered with a clean handkerchief or dressing, and as soon as possible (if not large) it should be scrubbed thoroughly with soap and water, using a soft nail-brush. Scrubbing must be gentle and must not injure the tissues. Larger wounds (which are not common) should be gently washed in soap and water. Sulphanilamide powder, if available, should be put into the wound, which must be left open. If a barb or foreign body is left in the wound, gentle attempts should be made to remove it. If not, cleansing should be done all round the barb, and the patient brought to a medical officer as soon as possible. Treatment for shock should be carried out, the patient kept warm and given warm drinks. Where there is severe local pain in these injuries, local anaesthetic should be injected round the site.

## IV. PREDACEOUS OR AGGRESSIVE FISHES.

Of the fishes or fish-like animals which attack man, sharks are the most dangerous. However, Sea Pike (*Sphyraena*), Reef Eels (*Gymnothorax*), and Gropers (*Promicrops*) may be vicious in tropical waters.

Details of shark attacks in or near Australia have been summarized by Whitley (1940)*. Once more, I am grateful to Dr. V. M. Coppleson for preparing, for this work, an authoritative course of treatment for persons wounded by sharks or other large fishes.

*G. P. Whitley.—"The Fishes of Australia. Part 1.—The Sharks, Rays, Devil Fish, &c." (Royal Zoological Society of New South Wales, Sydney, 1940).

Very large specimens may be skinned and the skin, with head intact, placed in preservative; it may be necessary to divide the backbone into sections so that the specimen can be folded to fit its receptacle. If spirits or formalin cannot be obtained, sea salt can be used for preservation. The fish is simply covered with a heap of salt, care being taken to fill the mouth and gills as well as the interior of the body with plenty of salt. After some hours, or by the next day at the latest, the specimen should be turned over, drained, and packed in fresh salt. The process should be repeated until the specimen is deprived of its moisture, when it can be packed in a box or crate with no other packing than the salt itself.

## VI. ACKNOWLEDGMENTS.

Special thanks are due to Mr. George Coates, of Townsville, Queensland, for supplying a series of excellent paintings, made from life, of poisonous fishes of north Queensland. Black-and-white illustrations have mostly been taken from publications on ichthyology by Bleeker, Cuvier and Valenciennes, Day, Delsman and Hardenberg, Gunther, McCulloch, Paradice, Sir John Richardson, Stead, Steindachner, Temminck and Schlegel, and Waite. Others are from the memoirs of the Queensland Museum or from blocks kindly lent by the trustees of The Australian Museum, Sydney.

Dr. V. M. Coppleson kindly supplied helpful advice from the medical standpoint, Mr. E. J. Ferguson Wood from the bacteriological, and Mr. T. C. Marshall provided some data on the Chinaman fish.

I am also indebted to the librarians of the British Medical Association (New South Wales branch), the Mitchell and Public Libraries, Sydney, and The Australian Museum for assistance with literature. A bibliography of poisonous and harmful fishes has been prepared for the more detailed report to be published separately.

J. J. Gourley, Government Printer, Melbourne.

PLATE I.

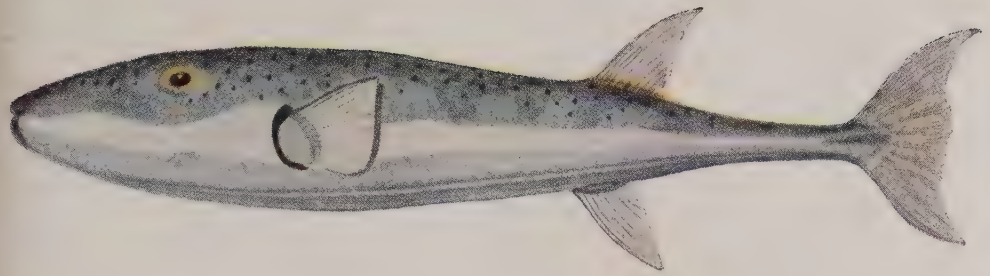

FIG. A (top).—Silver-cheek Toado, *Pleuranacanthus sceleratus.*

FIG. B (centre).—Narrow-lined Toado, *Ovoides immaculatus* (normal).

FIG. C (bottom).—Narrow-lined Toado, *Ovoides immaculatus* (inflated).

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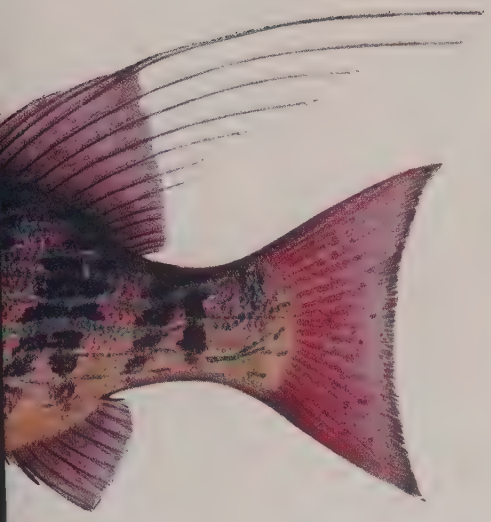
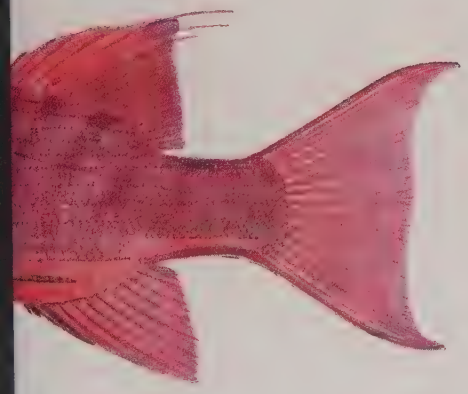
PLAT

FIG. A (above).—Chinaman Fish, *Par*
1½

FIG. B (below).—Chinaman Fish, *Para*





*dicichthys venenatus* (young example,
).

*ichthys venenatus* (half-grown, 8 lb.).

FIG. A (above).—Chinaman Fish, *Paradicichthys venenatus* (18 lb.).
FIG. B (below).—Red Bass *Lutjanus coatesi*.

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---

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126. Investigations on Chilled Beef. Part I.—Microbial Contamination Acquired in the Meatworks
127. Radio Research Board: Report No. 14
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188. A Soil, Land-Use, and Erosion Survey of Part of County Victoria, South Australia, including the Hundreds of Belalie, Whyte, Reynolds, and Anne, and Part of the Hundreds of Caltowie, Yangya, and Bundaleer
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194. A Procedure of Investigation in Fisheries Biology
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